

REMARKS

Claims 1-14 and 16-39 are pending and are rejected, of which claims 1, 17, 29 and 39 are in independent form. Applicant has amended claims 1, 9, 17, 24, 29, 34-36 and 39 and added claims 40-42. After entry of this amendment, claims 1-14 and 16-42 should be pending. Applicant respectfully requests reconsideration in view of the amendment and remarks.

I. Section 112 Rejection

Claims 17-31 and 34-36 are rejected as allegedly indefinite.

The Examiner rejected claims 17, 29 and 34 on the basis that it was unclear whether any physical limitations were indicated. Applicant disagrees. There are at least some physical configurations not covered by the claims. For example, where the mechanism that secures the retaining ring to the base is hidden between the upper portion and lower portion when the upper and lower portions are secured, the lower portion must be removed to access the mechanism, and thus the retaining ring cannot be removed as a unit. Nevertheless, claims 17, 29 and 34 have been amended to state that “the upper portion remains secured to the lower portion while the retaining ring is removed” to distinguish from mere simultaneous removal of the portions.

The Examiner rejected claim 35 and 36 on the basis that since the retaining ring is recited to be part of the carrier head it is unclear how it may be removed without disassembly of the carrier head. Amended claims 35 and 36 now recite that “the retaining ring is removable without disassembly of the base” to respond to the Examiner’s concerns.

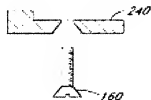
II. Rejections based on Maveety

Claims 1-3, 5, 7-10, 12, 13, 17, 20, 22-25, 27-32 and 34-39 stand rejected as allegedly anticipated by U.S. Patent 5,948,204 (“Maveety”). Claim 33 stands rejected as allegedly obvious over Maveety in view of U.S. Patent No. 5,944,593 (“Chiu”). Claims 11 and 26 stand rejected as allegedly obvious over Maveety, without a secondary reference.

A. Claims 1-14, 16, 32-35 and 39-41

Claims 1 and 39 require that that the lower portion lack any aperture from the top surface to the bottom surface of the lower portion.

In contrast, in Maveety, the wafer carrier ring 240 includes apertures (not numbered) through the wafer carrier ring, as shown in Figure 2:



The eight wear ring screws 160 are inserted from the bottom side through these apertures to secure the wafer carrier ring, as well as the seal ring 210, to the wafer carrier plate 260 (column 2, lines 55-58).

The Examiner argues that Maveety teaches screws filling the aperture “which clearly reads on the broadly recited claims.” Although the Examiner is entitled to give the claims their broadest reasonable construction, the Examiner’s claim construction is untenable. By the Examiner’s own admission, Maveety teaches apertures that are filled by screws. The apertures in the wafer retaining ring 240 remain apertures, even when filled by screws. Claims 1 and 39 require that the lower portion lack any aperture from the top surface to the bottom surface, which includes apertures filled by screws and apertures not filled by screws.

A problem with securing the wafer carrier ring 240 to the wafer carrier plate 260 by inserting screws from the bottom side through apertures, as shown in Maveety, is that slurry can be captured in the small gaps between the screws and aperture walls. This slurry can dry and become a source of particulates that cause scratching and defects on the wafers. Thus, apertures filled by screws are not equivalent to the absence of apertures.

Since Maveety does not teach a retaining ring in which the lower portion lacks any aperture from the top surface to the bottom surface, claims 1 and 39, and the claims depending therefrom, are patentable over Maveety.

B. Claims 17-31, 34-38 and 42

Claims 17, 29 and 34 require that the lower portion be joined to the upper portion and that the top surface be configured such that the retaining ring is removable as a unit from the base so that the upper portion remains secured to the lower portion while the retaining ring is removed.

In contrast, in Maveety, the ring assembly 201 is not removable as a unit from the carrier plate 260. This is because the seal ring 210 and wafer carrier ring 240 are each secured to the carrier plate 260 with separate screws 220 and 160, respectively, and the screw 220 that secures the seal ring 210 to the carrier plate 260 is hidden behind wafer carrier ring 240 once the ring assembly 201 is assembled.



In order to remove the seal ring 210, the wafer carrier ring 240 must be separately removed to expose the screw 220. Thus, in Maveety, the seal ring 210 and wafer carrier ring 240 are only removable as separate pieces, not as a unit.

The Examiner argues that Maveety's ring assembly 201 is removable as a unit by removing the upper portion and the lower portion at approximately the same time or by using cutting or disassembly means including destructive and/or non-destructive means.

First, it is not possible to remove Maveety's seal ring 210 and wafer carrier ring 240 at the same time in a non-destructive fashion; the Examiner should provide a specific example of how this would be accomplished in Maveety's system. As noted above, in order to remove the ring assembly 201, the wafer carrier ring 240 must be removed first to expose the screw 220.

Second, the ring assembly 240 cannot be said to be configured for destructive removal.

Consequently Maveety does not teach a retaining ring removable as a unit from the base so that the upper portion remains secured to the lower portion while the retaining ring is removed.

Therefore, in addition to the reasons for patentability over Maveety as set forth above, claims 17, 29 and 34, and the claims depending therefrom, are patentable over Maveety.

C. Claims 17-31 and 36-42

Claims 17, 29 and 39 require that the lower portion be secured to the upper portion before the upper portion is secured to the carrier head.

In contrast, in Maveety, the seal ring 210 must be secured to the carrier plate 260 before the wafer carrier ring 240 is secured to the seal ring 210. This is because the screw 220 that secures the seal ring 210 to the carrier plate 260 is hidden behind wafer carrier ring 240 once the ring assembly 201 is assembled. Thus, once the retaining ring assembly 201 is assembled, the head of the screw 220 is not accessible and the screw 220 cannot be screwed into the carrier plate 260. Consequently, Maveety does not teach a lower portion secured to the upper portion before the upper portion is secured to the carrier head.

Therefore, in addition to the reasons for patentability over Maveety as set forth above, claims 17, 29 and 39, and the claims depending therefrom, are patentable over Maveety.

D. Claims 14, 18 and 39-41

Claims 14, 18 and 39 require that the lower portion be secured to the upper portion with an adhesive.

Maveety teaches away from using an adhesive to attach the seal ring 210 to the wafer carrier ring 240. If the wafer carrier ring 240 were adhesively attached to the seal ring 210, the screw 220 would not be accessible once the ring assembly 201 is assembled, and the ring assembly 201 would not be removable from the carrier plate 260.

The Examiner did not reject claims 14 or 18 over Maveety.

Therefore, in addition to the reasons for patentability over Maveety as set forth above, claims 14, 18 and 39-41 are patentable over Maveety.

E. Claims 41 and 42

New claims 41 and 42 require that the top surface of the upper portion include a hole extending partially but not entirely through the upper portion to receive a fastener to mechanically affix the retaining ring to the base.

Maveety would not be modified such that an upper surface of the seal ring 210 includes a hole extending partially but not entirely through. As discussed above, Maveety teaches inserting a screws 160 and 220 from the underside entirely through the seal ring 210 into the carrier plate 260. If the holes did not extend entirely through the seal ring 210, it would be impossible to insert the screws 160 and 220 through to attach the seal ring 160 to the carrier plate 260. Thus, Maveety teaches away from a retaining ring in which the upper portion includes a hole extending partially but not entirely through the upper portion to receive a fastener to mechanically affix the retaining ring to the base.

Therefore, in addition to the reasons for patentability over Maveety as set forth above, claims 41 and 42 are patentable over Maveety.

III. Rejections based on Shendon

Claims 1-8, 12-13, 16-17, 20-23, 27-32 and 34-39 stand rejected as allegedly anticipated by EP 0 747 167 A2 ("Shendon"). Claims 9-11, 14, 18-19 and 24-26 stand rejected as allegedly obvious over Shendon, without a secondary reference. Claim 33 stands rejected as allegedly obvious over Shendon in view of U.S. Patent No. 5,944,593 ("Chiu").

A. Claims 1-14 and 16-42

The Examiner associates Shendon's retaining ring assembly 148 with the claimed "retaining ring". Applicant does not admit that this is a proper association. Applicant submits that a person of ordinary skill in the art would consider only the wafer perimeter retaining ring 162, not the retaining ring assembly 146, to constitute a retaining ring. In particular, a person of ordinary skill in CMP understands the term "retaining ring" to refer to a part that is easily detachable from the rest of the carrier so that it can be replaced once worn. In Shendon, it is the wafer perimeter ring 162 that is configured to be detached and replaced. In addition, the

Examiner's attention is directed to Shendon's own terminology; element 162 is identified as the retaining ring.

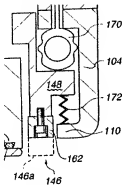
Shendon's wafer perimeter ring 162 is only a single piece, rather than an upper portion made of metal and a lower portion made of plastic.

Therefore, Applicant submits that claims 1-14 and 16-39 are patentable over Shendon.

B. Claims 1-14, 16, 29-36 and 38

Claims 1 and 29 recite that the top surface of the upper portion of the retaining ring be fixed to and abut the base "such that the retaining ring is vertically fixed relative to the base."

Shendon fails to teach a retaining ring that is vertically fixed relative to the base. Rather, as shown in Figure 4, Shendon's retaining ring assembly 146 is free to move vertically relative to the housing support plate 102 and the descending wall 104. This permits the pressure of the ring assembly 146 on the polishing pad to be adjusted.



Shendon would not be modified so that the retaining ring assembly 146 were vertically fixed relative to the housing support plate 102 or descending wall 104, because under such a configuration the pressure of the wafer perimeter ring 162 would not be adjustable (see column 4, lines 27-40). Thus, Shendon teaches away from a retaining ring vertically fixed relative to the base.

Therefore, in addition to the reasons for patentability over Shendon as set forth above, claims 1 and 29, and the claims depending therefrom, are patentable over Shendon.

C. Claims 35-36

Claims 35 and 36 require that the carrier head is configured such that the retaining ring is removable without disassembly of the base.

In addition to the reasons for patentability over Shendon as set forth above, Shendon fails to teach a carrier head in which the retaining ring is removable without disassembly of a base. In Shendon, the backing ring 148 is trapped between the housing support plate 102 and the descending wall 104. In order for the ring assembly 146 to be removed, the descending wall 104 would need to be disassembled from the support plate 102.

Therefore, in addition to the reasons for patentability over Shendon as set forth above, claims 35 and 36 are patentable over Shendon.

D. Claims 9, 24 and 40

Claims 9, 24 and 40 require a generally annular lower portion with a thickness between 100 and 400 mils and a durometer measurement between about 80 and 95 on the Shore D scale.

In addition to the reasons for patentability over Shendon as set forth above, Shendon also fails to teach a lower portion of a retaining ring with a thickness between 100 and 400 mils.

The Examiner argues that the dimensions of the lower portion would have been selected for the substrate to be polished without deforming the flexible ring during a polishing process. However, Shendon fails to teach that preventing deformation of the retaining ring is desirable.

In addition, the Examiner relies on *In re Gardner v. TEC Systems, Inc.* for the proposition that where the claimed relative dimension would not perform differently than the dimensions in the prior art device, the claimed device is not patentably distinct. However, the claimed range does operate differently than other ranges. In particular, by making the lower portion with a thickness between 100 and 400 mils, the rigidity from the upper portion dominates when the retaining ring is secured to the carrier head, thus reducing or eliminating the need for "break-in."

Therefore, in addition to the reasons for patentability over Shendon as set forth above, claims 9, 24 and 40 are patentable over Shendon.

E. Claims 14, 18 and 39-41

Claims 14, 18 and 39 require that the lower portion be secured to the upper portion with an adhesive.

Shendon teaches away from using an adhesive to attach the wafer perimeter retaining ring 162 to the backing ring 148. If the retaining ring 162 were adhesively attached to the backing ring 148, once the retaining ring 162 wears away, the entire retaining ring assembly 146 would need to be replaced, rather than just the retaining ring 162. A person of ordinary skill would be motivated to avoid this needless expense.

The Examiner argues that epoxy adhesive is a well-known expedient in the art of bonding plastic to metals, and that that it would have been obvious to use an epoxy as an alternative to screw attachment. Applicant disagrees.

While the use of epoxies may be generally known to bond plastic and metal, there are potential drawbacks to using an epoxy in a retaining ring. In particular, in operation, the retaining ring is subjected to significant lateral shear forces from the polishing pad. Applicant submits that a person of ordinary skill would be directed away from using epoxy due to the danger of failure of the epoxy as compared to a screw attachment.

Therefore, in addition to the reasons for patentability over Shendon as set forth above, claims 14, 18 and 39-41 are patentable over Shendon.

F. Claims 41 and 42

New claims 41 and 42 require that the top surface of the upper portion include a hole extending partially but not entirely through the upper portion to receive a fastener to mechanically affix the retaining ring to the base.

Shendon would not be modified to include a hole to receive a fastener. As discussed above, Shendon's retaining ring assembly 146 is free to move vertically relative to the housing support plate 102 and the descending wall 104. Since Shendon teaches away from a retaining ring vertically fixed relative to the base, Shendon also teaches away from modifying the backing ring to have a hole receive a fastener to mechanically affix the retaining ring to the base.

Therefore, in addition to the reasons for patentability over Shendon as set forth above, claims 41 and 42 are patentable over Shendon.

A petition for an extension of time under 37 C.F.R. § 1.136 is hereby made.

The fee in the amount \$1,730 for the extension of time is being paid on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please charge any shortage in fees due in connection with the filing of this paper to Deposit Account 06-1050 and please credit any excess fees to such deposit account.

Respectfully submitted,

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